# Qualitative Assessment for the Pete King Project Area Streams Using Proper Functioning Condition Approach (PFC) 2019

## Introduction

Field/Stream assessments were done during the spring of 2019 to determine the existing functionality and condition of important riparian areas (within close proximity to proposed activities) in the Pete King Project Area.

U.S. Forest Service, (Hydrologist and Fisheries Biologist with over 30 years of combined experience) working on the Pete King project conducted the assessment to better understand existing watershed conditions including cumulative effects to stream channel function from increased water yields and peak flows, managed and unmanaged roads, past wildfires. One main goal was to assess trends in functionality and stability based on the channel type and conditions while comparing existing condition to past assessments (E5.F21) and the forest plan baseline conditions for the streams. Furthermore it has been noted in past discussions and as per past cobble embeddedness (CE) surveys that Pete King fluctuating CE may be due to past management (past high road densities) in combination with unique geological features that cause build ups of finer martial in the lower reach of Pete King Creek (E5.F2, 3, 16 and E5.H36). This situation will be qualitatively assessed as the actual CE surveys don’t get at holistic stream conditions, causes or its results. This assessment is better served for that purpose. The assessment generally followed the process for determining stream channel function PFC developed by the BLM. See Appendix A for the PFC Checklist used. Also the assessment used an understanding of Rosgen 1998 morphological stream characteristics and stream channel types to describe stream dynamics and states of equilibrium.

In essence the approach of this assessment is to employ a methodology for assessing the physical functioning of riparian-wetland areas. The term PFC is used to describe both the assessment process, and a defined, on-the-ground condition of a riparian/wetland area. In either case, PFC defines a minimum level or starting point for assessing riparian/wetland areas. For the purposed of this assessment it is meant to provide strong clues as to the actual condition of habitat for plants and fish. Generally a riparian-wetland area in a physically nonfunctioning condition will not provide quality habitat conditions.

This assessment provides a consistent approach for assessing the physical functioning of riparian-wetland areas through consideration of hydrology, vegetation, and soil/landform attributes on a reach by reach basis. This assessment synthesizes information that is foundational to determining the overall health of a riparian-wetland areas within the Pete King watershed.

The on-the-ground condition will describe how well the physical processes are functioning. The state of resiliency of stream channels and reaches within the project area will be discussed which will allow a for an indication of riparian-wetland areas ability to hold together during a high-flow event and therefore sustaining the system’s ability to protect and maintain both physical (stream channel/morphology) and biological (fish populations and riparian vegetation)attributes.

Ultimately this assessment is meant to provide information on whether a riparian-wetland area is physically functioning in a manner that will allow the maintenance or recovery of desired values (e.g., fish habitat) over time.

This assessment is not meant to be the sole methodology for assessing the health of the aquatic and riparian-wetland areas within the project area (see E5.2 and E5.H36 for more information regarding riparian and watershed conditions).

Important fish species are found within the project area (E5.F2, 17, 18, 21 and Map E5.F20). In general, streams within the project area are have been previously assessed functioning properly hydrologically, exhibiting high stream bank stability and resiliency and containing moderate amounts of large woody material in many reaches (E5.H36 and E5.F21). Much of Pete King Creek is a perennial fish bearing stream and the largest stream within the project area. The remaining streams in the analysis area are smaller (4-2ft. wide) and many are steep (>20% slope). Many unnamed drainages that are either intermittent or seasonally drain into Pete King Creek (E5.F21) which eventually empties into the Lochsa River nearby. This analysis does not include the Lochsa because including this river would dilute any effects that may be caused by the project.

Suitable fish habitat is an essential part of maintaining healthy fish populations. For the purpose of this assessment there are five key factors that can affect fish and fish habitats within the project area and changes to these factors would determine a cause-and-effect relationship. These are in-stream and riparian ***large woody debris (LWD)***, ***riparian zone/steam channel function, connected habitats*** (no barriers) and ***riparian shade*** (stream temperatures) from trees and other vegetation as well as ***fine sediment*** (substrate)**.** For the purposes of this assessment these 5 factors constitute the fish habitat element that makes up cool, clean, connected and complex which are important for maintaining healthy fish populations and will help guide discussion regarding existing conditions and potential effects related to the proposed action. This assessment will qualitatively discuss existing conditions of these factors that affect the fish habitat element.

There are approximately 20 miles of main-stem and tributary fish-bearing streams within the Pete King Creek watershed validated by extensive surveys (E5.F20 and 21). The smaller perennial fish bearing tributaries within the Pete King watershed are Nut Creek, Walde Creek, Placer Creek, Polar Creek and the West Fork of Pete King Creek. These areas occur in the main-stem and lower reaches of the tributaries where stream gradients are relatively low (<6%) and suitable habitat for fish spawning and rearing is present (E5.F17, 20, 21). Fish sampling surveys and habitat information was used to determine where the extent of presence and of habitat available for the three key native fish species found in the watershed (Table 1). Within the Pete King watershed there is approximately 20 miles of westslope cutthroat habitat, 9 miles of steelhead/rainbow trout habitat and 4 miles of Chinook salmon habitat. There several more miles of perennial and/or intermittent streams and stream reaches within the Pete King sub-watershed that do not contain fish due to natural barriers, low flows, small size, high gradients and/or a general lack of habitat.

Pete King main-stem is a fourth order tributary to the Lochsa River. In forested ecosystems woody debris plays a particularly important role in smaller 1st and 2nd order streams (which are the majority of the stream in the project area), since it slows stream flows, dissipates energy, stores organic and sediment materials, and decreases potential for channelization and loss of fine material (Jackson and Strum 2002).

Pete King watershed ranges from 450 to 1591 meter in elevation. Predominate landtypes within the Pete King Creek watershed include moderate relief rolling uplands, low relief rolling hills, mountain slopelands, and stream breaklands. The lower mainsteam of Pete King Creek is bordered by a floodplain of moderate width.

Forest Service managed lands in Pete King Creek are dominated by mixed conifer tree species in both upslope and riparian areas. Portions of the main-stem of Pete King Creek contains meadow habitats dominated by tall shrubs, grasses and forbs. The natural major disturbances that contribute to aquatic habitat development in project area streams are infrequent fire and large flood events, and to a lesser extent landslides, and windthrow events. These disturbances provide both large woody material and substrate which is important in forming and maintain complex fish habitat to streams under natural conditions.

It is important to note that streams in the Pete King Drainage typically have elevated levels of fine sediment in their beds as a consequence of unique natural geologic features. The stream, therefore, has a tendency to be sediment surplus and energy limited. Historic natural forest fires and historic forest management activities (pre PACFISH RHCA protection and modern BMP implementation) in the headwaters have also contributed to erosion and sedimentation to the watersheds stream courses. Historic fires that burned heavily in the riparian areas along with historic riparian logging removed large woody debris and delayed recruitment of new inputs large woody debris (E5.F21).

For the purpose of this assessment Pete King Creek was delineated into distinct reaches within the project area based on channel type, significant morphological or topographic changes natural breaks, accessibility, potential for effects due to proposed activities and perceived riparian condition to assess Proper Functioning Condition (PFC).

Summary of findings: Project area and watershed main-stem stream (Pete King Creek) reaches were functioning properly and no sign of appreciable bank erosion was noted. Streams within the watershed appeared to have low to very low turbidity (indication of minimal erosion or sedimentation). Stream banks appeared stable and well vegetated. LWD was present in most reaches and was effectively protecting stream banks and dissipating stream flow energy. All main, stream channels indicated Proper Function and accommodation of normal high-flow runoff events without appreciable stream bank disturbance, erosion, bed load movement, decreased water quality and/or increase in turbidity. The main reason for the stability in the stream banks appeared to be riparian vegetation including trees and deep rooted grasses and in stream LWD.

Stream channel segments in the lowest reach, which flows through private land used periodically for grazing, appeared to have slightly elevated bank disturbance. This is the area where cobble embeddedness surveys are done and may be part of the reason for elevated CE survey results however this has not been previously indicated. None the less it appeared that most of the localized bank erosion was occurring in areas where vegetation was disturbed along the channel from cattle grazing. This segment of stream channel in reach 1, through private land, would remain susceptible to localized bank erosion due to stream side vegetation disturbances, as it likely has since homesteading and grazing began decades ago in this reach. Even though this reach has been subject to a long history of grazing, the overall stream channel segment appears to have maintained relative horizontal and vertical stability over time.

Table 1. Summarization of project area qualitatively assessed stream/reach conditions

| Stream Segment | Reach Length (feet) | PFC Rating | Trend | Stream Segment |
|---|---|---|---|---|
| | | | | |
| Pete King Reach 1 | ~9,650 | FAR | No Trend | This reach that flows through private may be more sensitive to aggradation and channel instability given that it is a lower gradient transition zone for alluvium settling as gradients become slightly more gradual. Furthermore grazing and channel modification has occurred in the past. Low to moderate levels of riparian vegetation, for stability and recruitment, and in-stream LWD exists in this reach. No apparent trend was noted because the stream channel appears to maintain stability given deep rooted stream bank grasses and rotted riparian broad leaf species. Steam bank do not appear to have recent excessive bank erosion occurrences. Vertically and horizontally stable at this time and confined within the valley limiting potential for movement. |
| Pete King Creek Reach 2 | ~5,500 | PFC | Maintained | RHCA intact. Abundant floodplain vegetation (multiple age classes for LWD maintenance and recruitment) on 90% of reach, stable soils and/or land form characteristics existing and inherent stable stream channel type. Moderate amounts of stable instream LWD. Minimal channel bed movement. Vegetated point bars indicate stable hydrologic process. |
| Pete King Creek Reach 3 | ~4255 | PFC | Maintained | RHCA intact. Abundant stream bank vegetation (multiple age classes for LWD maintenance and recruitment) on 100% of reach, stable soils and/or land form characteristics existing and inherent stable stream channel type. Stream gradients (>5%) and substrate inherently stable and resilient. Abundant and stable instream LWD. Minimal channel bed movement. Vertically and horizontally stable. Stable bedrock/boulder controls throughout this reach. B channel types (Rosgen 1995). Vegetated point bars and substrate indicate stable hydrologic process. No evulsions or aggradation of bedload were observed. |
| Pete King Creek Reach 4 | ~8295 | PFC | Maintained | RHCA intact. Abundant deep rooted stream bank and flood plain vegetation (multiple age classes for LWD maintenance and recruitment) on 100% of reach, stable soils and/or land form characteristics existing and inherent stable stream channel type. Stream gradients (>6%) and substrate inherently stable and resilient. Abundant and stable instream LWD. Minimal channel bedload movement. Vertically and horizontally stable. Stable bedrock/boulder controls throughout this reach. B channel types (Rosgen 1995). Vegetated point bars and substrate (moss) indicate stable hydrologic process. No evulsions or aggradation of bedload were observed. |
| Pete King Creek Reach 5 | ~8700 | PFC | Maintained | Abundant floodplain/stream bank vegetation (multiple age classes for LWD maintenance and recruitment), stable soils and/or land form characteristics existing and inherent stable stream channel type. Stream gradients (>5%-15%) and substrate inherently stable and resilient. Vertically and horizontally stable. Lake system above this reach affords moderated flows and headwater inputs. B-A channel types (Rosgen 1995). Vegetated point bars and substrate indicate (moss) stable hydrologic process. No evulsions or aggradation of bedload were observed. |
| Pete King Creek Reach 6 | ~18000 | PFC | Maintained | Abundant floodplain/stream bank vegetation (multiple age classes for LWD maintenance and recruitment), stable soils and/or land form characteristics existing and inherent stable stream channel type. Stream gradients (>8%-20%) and substrate inherently stable and resilient. Abundant and stable instream LWD. Minimal channel bedload movement. Vertically and horizontally stable. |

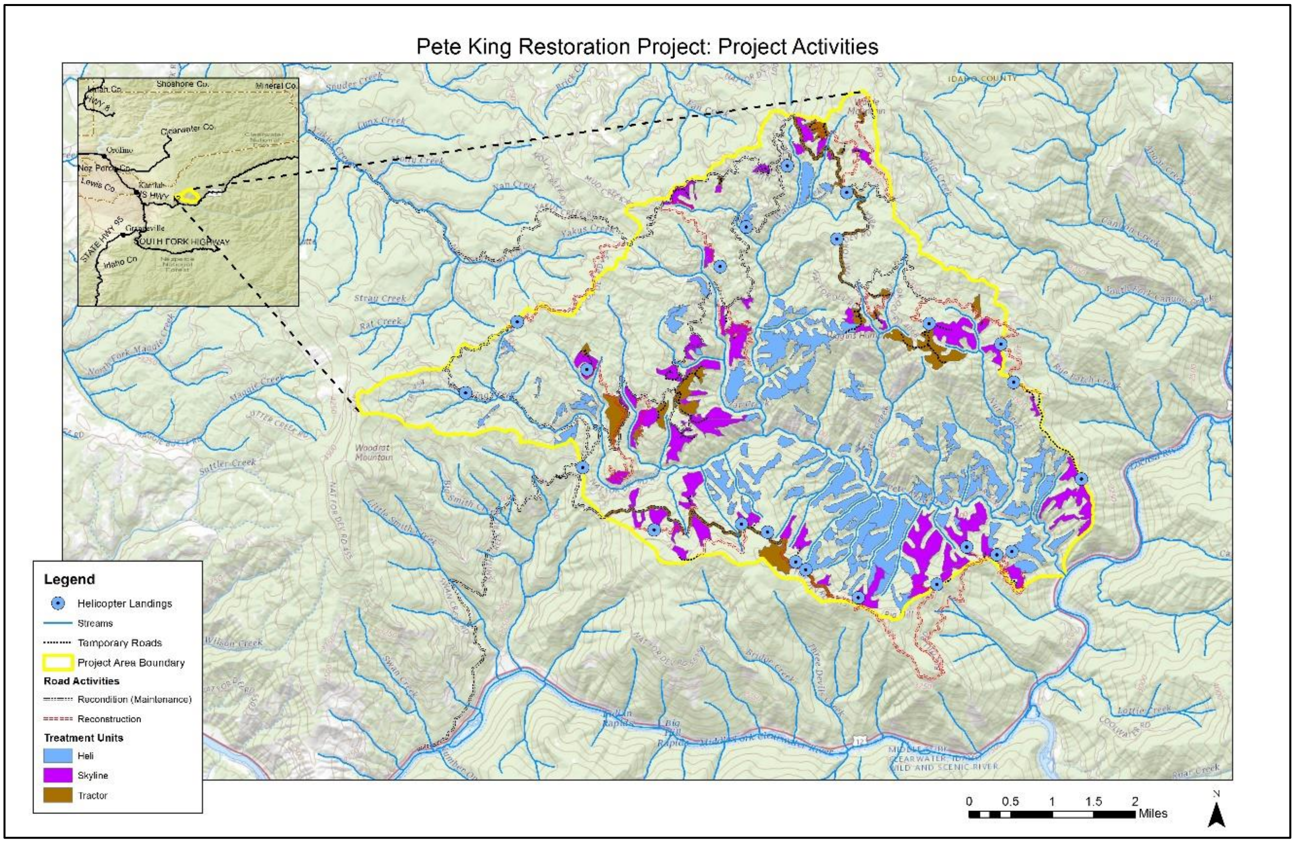
## Contributors and Participants

**Stream Assessment Team:**

Tim Price-Team Fish Biologist -USFS

Chris Robinson -Team Hydrologist - USFS

## Assessment Area Description and Streams



## Assessment Results

## Pete King Creek Assessment Results

**Assessed Reach 1 (~9650ft):** This reach flows through private land in the lower end and directly into the Lochsa River however most of the reach is on Forest Service Managed lands. The reach appears to have had some selective riparian harvest previously given old cedar stumps noted during the field survey. This harvest is estimated at well over 50 (estimated during the 1960s or 70s) years ago long before modern riparian buffers were required. Residual materials derived from resistant rock types such as colluvium and or alluvium adds significant control and adequate sources of existing and recruitment of large wood (LWD) as well as healthy amounts of riparian-wetland vegetation has help maintain channel/stream bank stability. This reach and will most likely remain resistant to large scale evulsions and catastrophic disturbances such as large flood events (Photo 2, 3 and 5). There is enough channel and floodplain vegetation, soils or land form characteristics to withstand large flood events without significantly damaging the riparian corridor. Channel in confined in areas due to valley form. The channel is relatively stable vertically and laterally (photo 1, 2, 3, 4 and 5) which means it has limited ability to laterally scour and or vertically scour or down-cut. The channel type of this reach is primarily a Rosgen "C/B". Channel slopes for this type typically range from 3-8%, substrate ranges from cobbles and boulders to a mix of gravels and small gravel alluvium. No major evulsions or aggradation of bedload were observed. The stream habitat in this reach is influenced heavily by large woody debris which has produced scour pools and riffles. Large woody debris (LWD) and riparian vegetation is an integral part of this type of stream system. LWD and riparian vegetation dissipates erosive energy, controls bedload transport, stabilizes stream channels, and creates suitable habitat for fish and other aquatic organisms. Vegetated point bars and substrate indicate stable hydrologic process. The stream channel is shaded mostly by a dense over-story of mature deciduous trees and brush but limited adjacent LWD recruitment. In summary this stream channel reach, just below the project area and therefore most subject to effects, should remain in a stabilized condition and should continue to improving in complexity and stability over time and trend toward desired conditions for aquatic habitat (i.e. embeddedness) as existing fine sediments move out of the system and minimal fines are input. The fish habitat suitability (pools, complexity, clean water and shade) in this reach should be maintained or improved over time given the protective riparian buffers which will remain intact.

This reach is rated as **Functioning at Risk (FAR) with No Apparent Trend**: Due to the existence of the adjacent forest road which limits flood plain controls and dynamics, limited LWD recruitment in the lower end of the reach and available alluvial stream bank material.

Photo 1: Pete King Creek Assessment Reach 1 (46°10'15.21" N 115°35'33.80" W)


Photo 2: Pete King Creek Assessment Reach 1 future LWD recruitment.

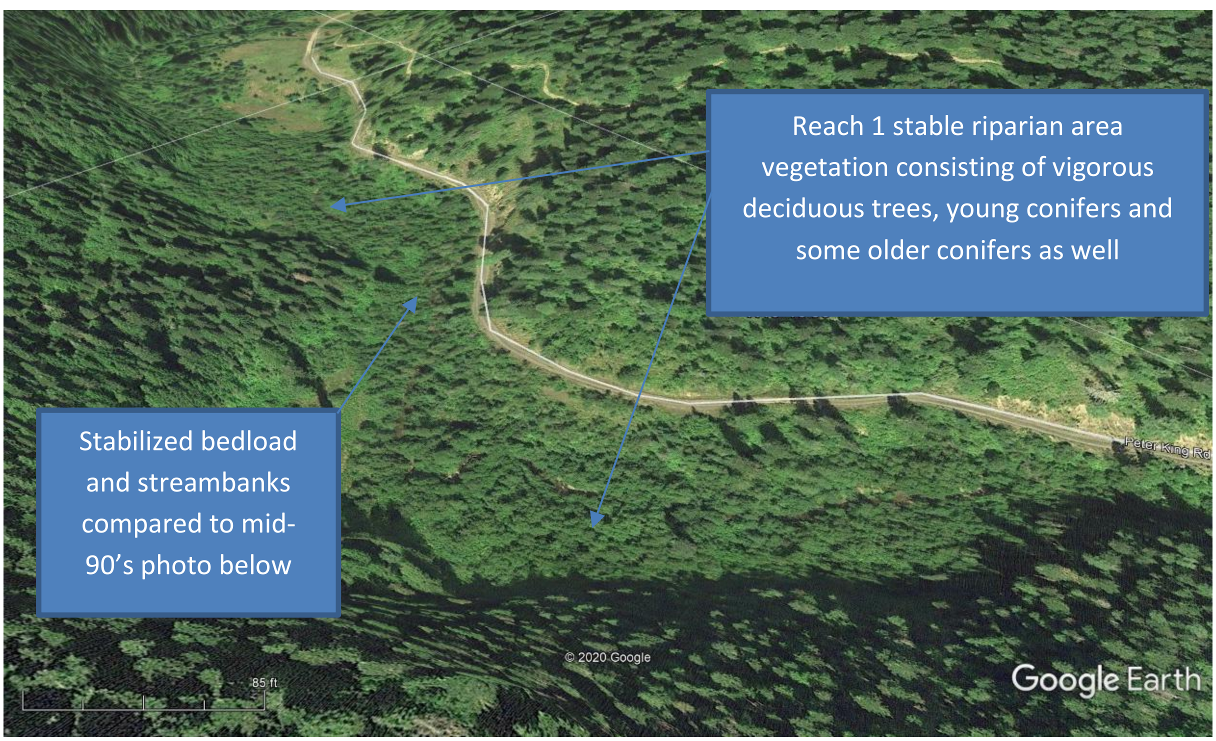


Photo 3: Pete King Creek Assessment Reach 1 mid 1990s Photo. Showing very little change in channels over time indicating stability and upward trend considering greater abundance of stream side vegetation today (compare photo 2 and 3) and less gravel bars today indicating less bedload movement and stable channel.

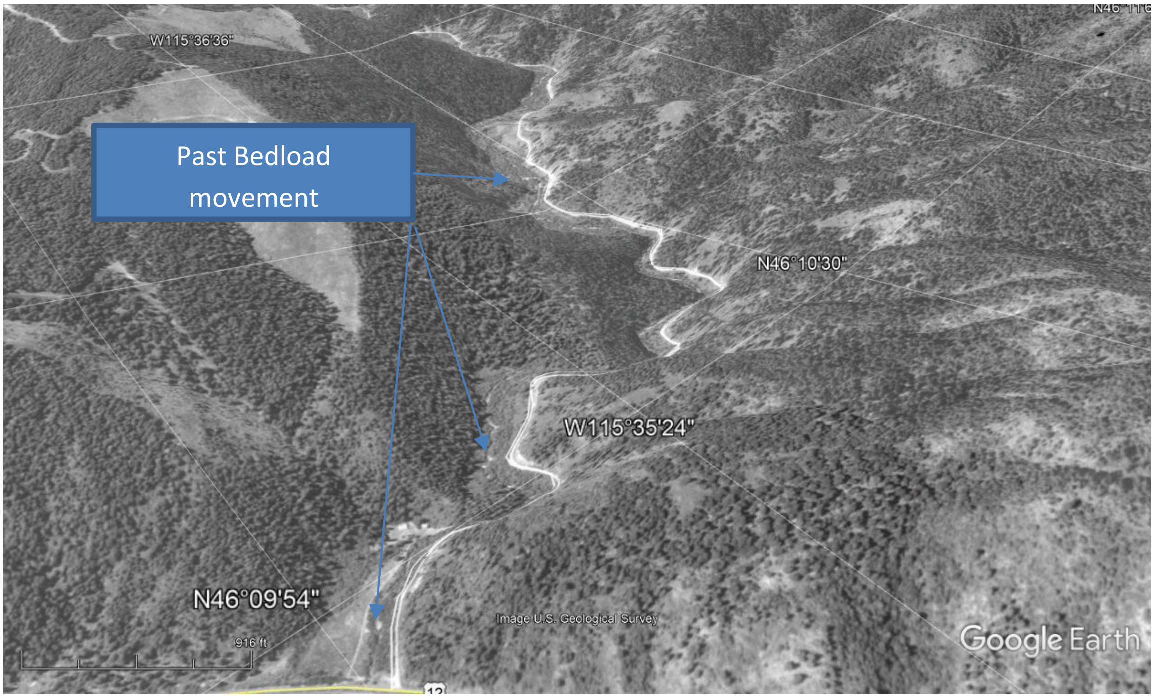



Photo 4 Reach 1: Pete King Confluence with the Locsha River. Stable and functioning road stream crossing.

Photo 5 Reach 1: Pete King showing heavy vegetation on stream banks for stability and shade

**Pete King Assessed Reach 2 (~5500ft):** This reach flows through Forest Service land in the lower end of the watershed. This appears to have had some riparian harvest (likely in the 1970s) previously given old cedar stumps. This harvest is estimated at well over 50 years ago long before modern riparian buffers were required. Residual materials derived from resistant rock types such as colluvium and or alluvium adds significant control and adequate sources of existing and recruitment of large wood (LWD) as well as healthy amounts of riparian-wetland vegetation has help maintain channel/stream bank stability. This reach and will most likely remain resistant to large scale evulsions and catastrophic disturbances such as large flood events. There is enough channel and floodplain vegetation, soils or land form characteristics to withstand large flood events without significantly damaging the riparian corridor. Channel in confined in areas due to valley form. The channel is relatively stable vertically and laterally (photo 6, 7, 8, and 9) which means it has limited ability to laterally scour and or vertically scour or down-cut. The channel type of this reach is primarily a Rosgen “B”. Channel slopes for this type typically range from 5-10%, substrate ranges from cobbles and boulders to a mix of gravels and small gravel alluvium. No major evulsions or aggradation of bedload were observed. The stream habitat in this reach is influenced heavily by riparian vegetation and some large woody debris which has produced scour pools and riffles. Large woody debris (LWD) is an integral part of this type of stream system. LWD and stream bank vegetation dissipates erosive energy, controls bedload transport, stabilizes stream channels, and creates suitable habitat for fish and other aquatic organisms. Vegetated point bars and substrate indicate stable hydrologic process. The stream channel is shaded mostly by a dense over-story of mature deciduous trees and brush but limited adjacent LWD recruitment. Moss on in stream wood and rocks indicate moderate to low erosive stream hydrology. In summary this stream channel reach, just below the project area and therefore most subject to effects, should remain in a stabilized condition and should continue to improving in complexity and stability over time and trend toward desired conditions for aquatic habitat (i.e. lower embeddedness) as existing fine sediments move out of the system and minimal fines are input. The fish habitat suitability (pools, complexity, clean water and shade) in this reach should be maintained or improved over time given the protective riparian buffers which will remain intact.

This reach is rated as **Proper Function Condition (PFC)**

Photo 6: Pete King Creek Assessment Reach 2 (46°10'24.34" N 115°37'49.50" W)


Photo 7: Pete King Creek Assessment Reach 1 mid 1990s Photo.  Showing very little change in channels over time indicating stability and upward trend considering greater abundance of stream side vegetation today (compare photo 6 and 7) and less gravel bars indicating less bedload movement.

Photo 8 Reach 2: Pete King showing heavy vegetation on stream banks for stability and shade. Steam banks are stable and there is vegetation growing on point bars indicating channel stability and resiliency to high flow events.

Photo 9 Reach 2: Pete King showing past stream enhancement project aiding sedimentation dispersion and promoting point bar formation and vegetation. Heavy vegetation on stream banks for stability and shade. Steam banks are stable and there is vegetation growing on point bars indicating channel stability and resiliency to high flow events.

**Pete King Assessed Reach 3 (~4255ft):** This reach flows through Forest Service land in the middle portion of the watershed. This appears to have had some riparian harvest (likely in the 1970s) previously given old cedar stumps. This harvest is estimated at well over 50 years ago long before modern riparian buffers were required. Residual materials derived from resistant rock types such as colluvium and or alluvium adds significant control and adequate sources of existing and recruitment of large wood (LWD) as well as healthy amounts of riparian-wetland vegetation has help maintain channel/stream bank stability. This reach and will most likely remain resistant to large scale evulsions and catastrophic disturbances such as large flood events. There is enough channel and floodplain vegetation, soils or land form characteristics to withstand large flood events without significantly damaging the riparian corridor. Channel in confined in areas due to valley form. The channel is relatively stable vertically and laterally (photo 10, 11, 12, 13 and 14) which means it has limited ability to laterally scour and or vertically scour or down-cut. The channel type of this reach is primarily a Rosgen "B". Channel slopes for this type typically range from 8-12%, substrate ranges from cobbles and boulders to a mix of gravels and small gravel alluvium. No major evulsions or aggradation of bedload were observed. The stream habitat in this reach is influenced heavily by riparian vegetation and some large woody debris which has produced scour pools and riffles. Large woody debris (LWD) is an integral part of this type of stream system. LWD and stream bank vegetation dissipates erosive energy, controls bedload transport, stabilizes stream channels, and creates suitable habitat for fish and other aquatic organisms. Vegetated point bars and substrate indicate stable hydrologic process. The stream channel is shaded mostly by a dense over-story of mature deciduous trees and brush but limited adjacent LWD recruitment. Moss on in stream wood and rocks indicate moderate to low erosive stream hydrology. In summary this stream channel reach, just below the project area and therefore most subject to effects, should remain in a stabilized condition and should continue to improving in complexity and stability over time and trend toward desired conditions for aquatic habitat (i.e. lower embeddedness) as existing fine sediments move out of the system and minimal fines are input. The fish habitat suitability (pools, complexity, clean water and shade) in this reach should be maintained or improved over time given the protective riparian buffers which will remain intact.

This reach is rated as **Proper Function Condition (PFC)**

Photo 10: Pete King Creek Assessment Reach 3 (46°10'47.09"N   115°38'41.34" W)


Photo 11: Pete King Creek Assessment Reach 1 mid 1990s Photo.  Showing very little change in channels over time indicating stability and upward trend considering greater abundance of stream side vegetation today (compare photo 10 and 11) and less gravel bars indicating less bedload movement.

Photo 12 Reach 3: Pete King showing heavy vegetation on stream banks for stability and shade. Steam banks are stable. Channel type and substrate indicating high channel stability and resiliency to high flow events.

Photo 13 Reach 3: Pete King showing heavy vegetation on stream banks for stability and shade. Steam banks are stable. LWD plays a key role in habitat formation. Channel type inherently stable.

**Pete King Assessed Reach 4 (~8295ft):** This reach flows through Forest Service land in the middle portion of the watershed. Residual materials derived from resistant rock types such as colluvium and or alluvium adds significant control and adequate sources of existing and recruitment of large wood (LWD) as well as healthy amounts of riparian-wetland vegetation has help maintain channel/stream bank stability. This reach and will most likely remain resistant to large scale evulsions and catastrophic disturbances such as large flood events. There is enough channel and floodplain vegetation, soils or land form characteristics to withstand large flood events without significantly damaging the riparian corridor. Channel in confined in areas due to valley form. The channel is relatively stable vertically and laterally (photo 14-18) which means it has limited ability to laterally scour and or vertically scour or down-cut. The channel type of this reach is primarily a Rosgen "B". Channel slopes for this type typically range from 8-12%, substrate ranges from cobbles and boulders to a mix of gravels and small gravel alluvium. No major evulsions or aggradation of bedload were observed. The stream habitat in this reach is influenced heavily by riparian vegetation and some large woody debris which has produced scour pools and riffles. Large woody debris (LWD) is an integral part of this type of stream system. LWD and stream bank vegetation dissipates erosive energy, controls bedload transport, stabilizes stream channels, and creates suitable habitat for fish and other aquatic organisms. Vegetated point bars and substrate indicate stable hydrologic process. The stream channel is shaded mostly by a dense over-story of mature deciduous trees and brush but limited adjacent LWD recruitment. Moss on in stream wood and rocks indicate moderate to low erosive stream hydrology. In summary this stream channel reach, just below the project area and therefore most subject to effects, should remain in a stabilized condition and should continue to improving in complexity and stability over time and trend toward desired conditions for aquatic habitat (i.e. lower embeddedness) as existing fine sediments move out of the system and minimal fines are input. The fish habitat suitability (pools, complexity, clean water and shade) in this reach should be maintained or improved over time given the protective riparian buffers which will remain intact.

This reach is rated as **Proper Function Condition (PFC)**

Photo 14: Pete King Creek Assessment Reach 4 - 46°10'47.09"N   115°38'41.34" W


Photo 15: Pete King Creek Assessment Reach 4 mid 1990s Photo.  Showing very little change in channels over time indicating stability and upward trend considering greater abundance of stream side vegetation today (compare photo 15 and ) and less gravel bars indicating less bedload movement.

Photo 16 Reach 4: Pete King showing heavy vegetation on stream banks for stability and shade. Steam banks are stable. High channel stability and resiliency to high flow events given inherency of channel type.

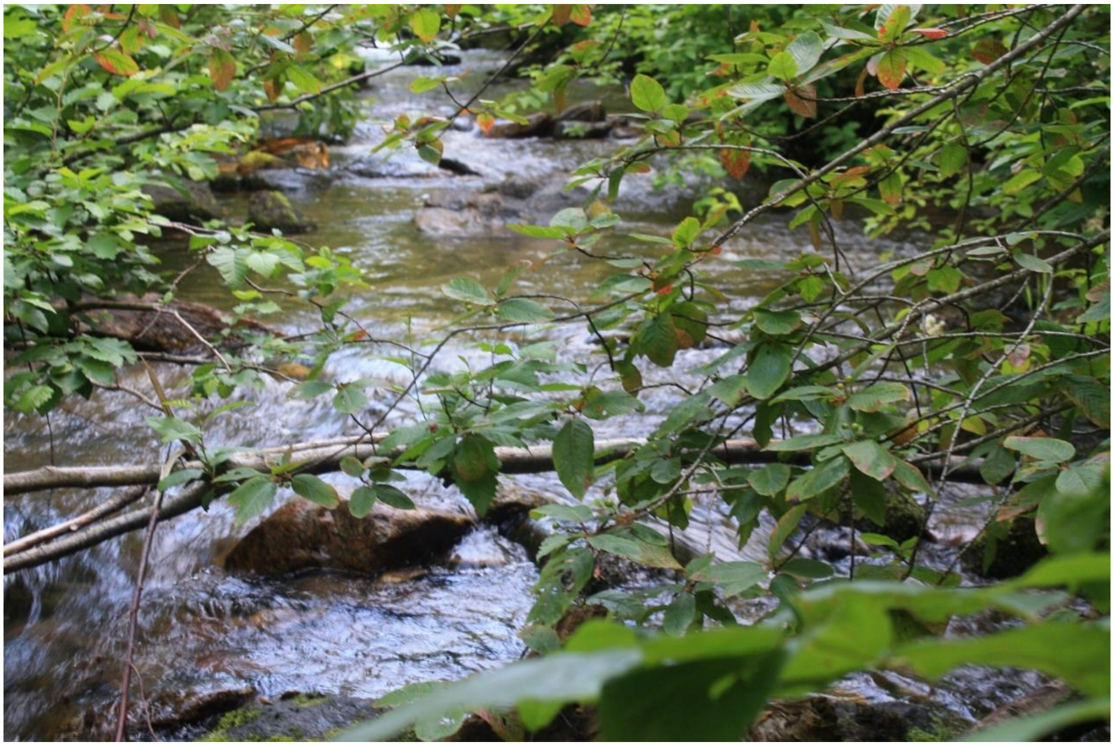


Photo 17 Reach 4: Pete King showing heavy vegetation on stream banks for stability and shade. Channel stability and resiliency to high flow events is high.

Photo 18 Reach 4: Pete King showing heavy vegetation on stream banks for stability and shade. Steam banks are stable. LWD plays a key role in habitat formation. Channel type inherently stable.

**Pete King Assessed Reach 5 (~8700ft):** The channel type of this reach is primarily a Rosgen "B". Channel slopes for this type typically range from 8-12%, substrate is a mix of cobbles and gravel alluvium. The stream habitat in this reach is influenced heavily by large woody debris which has produced scour pools and riffles (Photo 22 and 23). Large woody debris (LWD) is an integral part of this type of stream system. LWD dissipates erosive energy, controls bedload transport, stabilizes stream channels, and creates suitable habitat for fish and other aquatic organisms. The stream channel is shaded by a dense overstory of mature cedar and fir trees that also provide LWD recruitment. Moss on in stream wood and rocks indicate moderate to low erosive stream hydrology. In summary this stream channel reach, adjacent to the project area and therefore most subject to effects should, given the RHCA buffers, remain in a stabilized condition and should continue to improve in complexity and stability over time and trend toward desired conditions for aquatic habitat as existing fine sediments move out of the system and minimal fines are input. The fish habitat suitability (pools, complexity, clean water and shade) in this reach should be maintained or improved over time given the protective riparian buffers which will remain intact.

Residual materials derived from resistant rock types such as colluvium and or alluvium adds significant control and adequate sources of existing and recruitment of large wood (LWD) as well as healthy amounts of riparian-wetland vegetation has help maintain channel/stream bank stability. This reach and will most likely remain resistant to large scale evulsions and catastrophic disturbances such as large flood events (Photo 19-22). There is enough channel and floodplain vegetation, soils or land form characteristics to withstand large flood events without significantly damaging the riparian corridor. Channel in confined in areas due to valley form. The channel is relatively stable vertically and laterally (photo 21 and 23) which means it has limited ability to laterally scour and or vertically scour or down-cut. The channel type of this reach is primarily a Rosgen "B". Channel slopes for this type typically range from 8-12%, substrate ranges from cobbles and boulders to a mix of gravels and small gravel alluvium. No major evulsions or aggradation of bedload were observed. The stream habitat in this reach is influenced heavily by riparian vegetation and some large woody debris which has produced scour pools and riffles. Large woody debris (LWD) is an integral part of this type of stream system. LWD and stream bank vegetation dissipates erosive energy, controls bedload transport, stabilizes stream channels, and creates suitable habitat for fish and other aquatic organisms. Vegetated point bars and substrate indicate stable hydrologic process. The stream channel is shaded mostly by a dense over-story of mature deciduous trees and brush but limited adjacent LWD recruitment. Moss on in stream wood and rocks indicate moderate to low erosive stream hydrology. In summary this stream channel reach, just below the project area and therefore most subject to effects, should remain in a stabilized condition and should continue to improving in complexity and stability over time and trend toward desired conditions for aquatic habitat (i.e. lower embeddedness) as existing fine sediments move out of the system and minimal fines are input. The fish habitat suitability (pools, complexity, clean water and shade) in this reach should be maintained or improved over time given the protective riparian buffers which will remain intact.

This reach is rated as **Proper Function Condition (PFC)**

Photo 19: Pete King Creek Assessment Reach 5 (46°11'23.53"N   115°40'04.83" W)

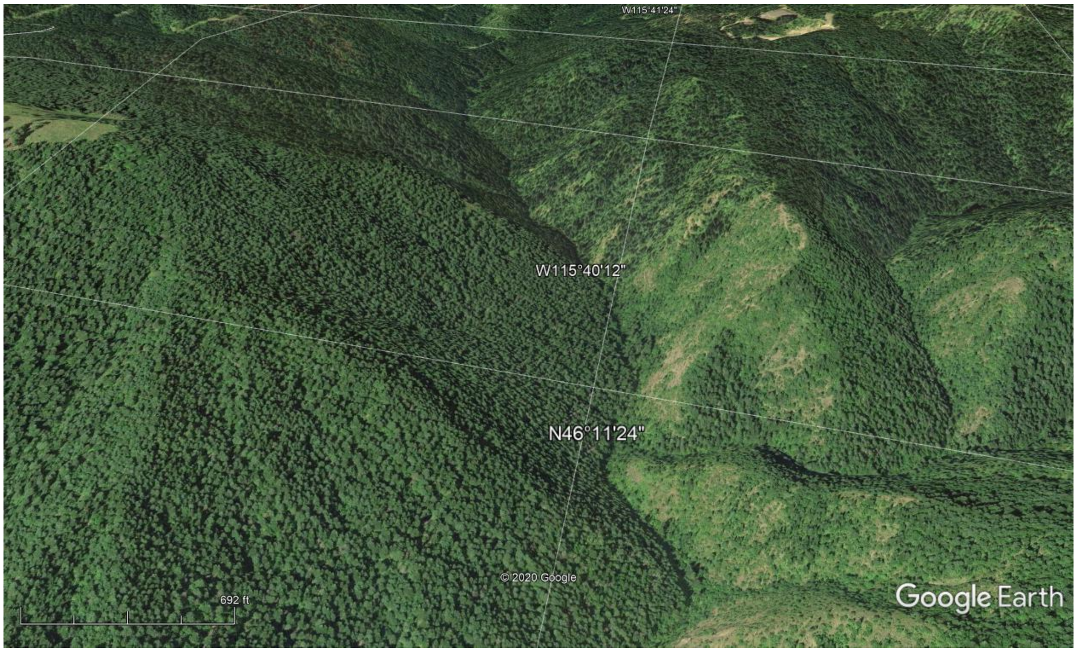



Photo 20: Pete King Creek Assessment Reach 4 mid 1990s Photo.  Showing very little change in channels over time indicating stability and upward trend considering greater abundance of stream side vegetation today (compare photo 2 and 3) and less gravel bars indicating less bedload movement.

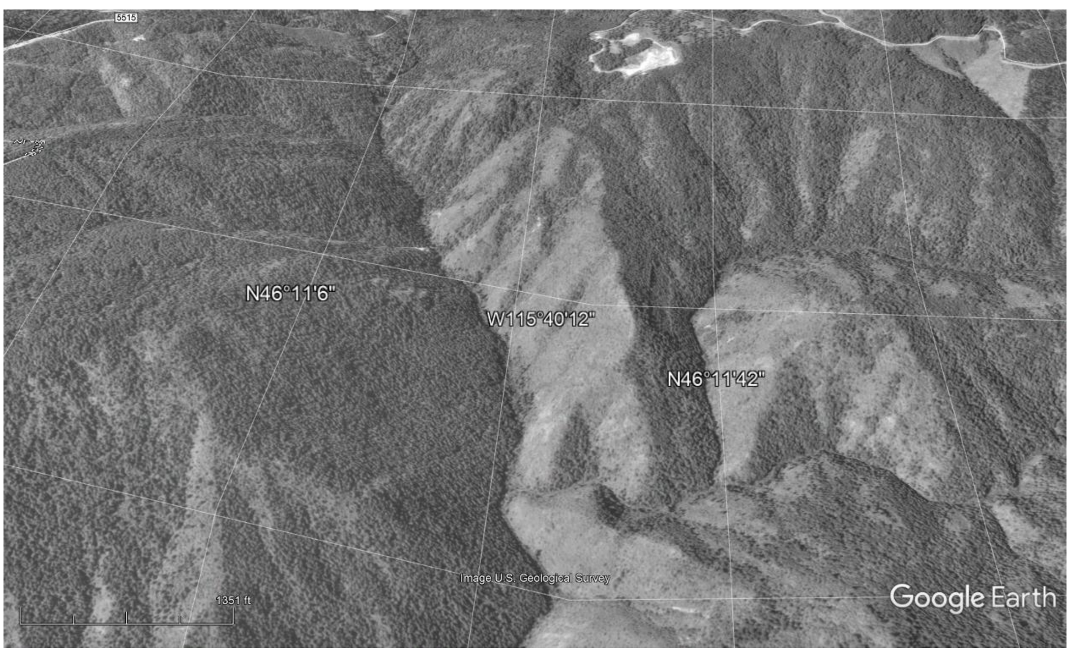


Photo 21 Reach 5: Pete King showing heavy vegetation on stream banks for stability and shade. Steam banks are stable. LWD plays a key role in fish habitat formation. Channel type inherently stable.

Photo 22 Reach 5: Pete King showing heavy vegetation on stream banks for stability and shade. Channel stability and resiliency to high flow events is high.

Photo 23 Reach 5: Pete King showing heavy vegetation on stream banks for stability and shade. Channel stability and resiliency to high flow events is high. Moss on wood and rock indicate stable stream channel and flows.

**Pete King Assessed Reach 6 (~18000ft):** Large woody debris (LWD) is an integral part of this type of stream system. LWD dissipates erosive energy, controls bedload transport, stabilizes stream channels, and creates suitable habitat for fish and other aquatic organisms. The stream channel is shaded by a dense overstory of mature cedar and fir trees that also provide LWD recruitment. Moss on in stream wood and rocks indicate moderate to low erosive stream hydrology. In summary this stream channel reach, adjacent to the project area and therefore most subject to effects should, given the RHCA buffers, remain in a stabilized condition and should continue to improve in complexity and stability over time and trend toward desired conditions for aquatic habitat as existing fine sediments move out of the system and minimal fines are input. The fish habitat suitability (pools, complexity, clean water and shade) in this reach should be maintained or improved over time given the protective riparian buffers which will remain intact.

Residual materials derived from resistant rock types such as colluvium and or alluvium adds significant control and adequate sources of existing and recruitment of large wood (LWD) as well as healthy amounts of riparian-wetland vegetation has help maintain channel/stream bank stability. This reach and will most likely remain resistant to large scale evulsions and catastrophic disturbances such as large flood events (Photo 29-34). There is enough channel and floodplain vegetation, soils or land form characteristics to withstand large flood events without significantly damaging the riparian corridor. Channel in confined in areas due to valley form. The channel is relatively stable vertically and laterally (photo 24-34) which means it has limited ability to laterally scour and or vertically scour or down-cut. The channel type of this reach is primarily a Rosgen “B/A”. Channel slopes for this type typically range from 8-20%, substrate ranges from cobbles and boulders to a mix of gravels and small gravel alluvium. No major evulsions or aggradation of bedload were observed. The stream habitat in this reach is influenced heavily by riparian vegetation and some large woody debris which has produced scour pools and riffles. Large woody debris (LWD) is an integral part of this type of stream system. LWD and stream bank vegetation dissipates erosive energy, controls bedload transport, stabilizes stream channels, and creates suitable habitat for fish and other aquatic organisms. Vegetated point bars and substrate indicate stable hydrologic process. The stream channel is shaded mostly by a dense over-story of mature deciduous trees and brush but limited adjacent LWD recruitment. Moss on in stream wood and rocks indicate moderate to low erosive stream hydrology. In summary this stream channel reach, just below the project area and therefore most subject to effects, should remain in a stabilized condition and should continue to improving in complexity and stability over time and trend toward desired conditions for aquatic habitat (i.e. lower embeddedness) as existing fine sediments move out of the system and minimal fines are input. The fish habitat suitability (pools, complexity, clean water and shade) in this reach should be maintained or improved over time given the protective riparian buffers which will remain intact.

This reach is rated as **Proper Function Condition (PFC)**

Photo 24: Pete King Creek Assessment Reach 6 (46°11'23.53"N   115°40'04.83" W)

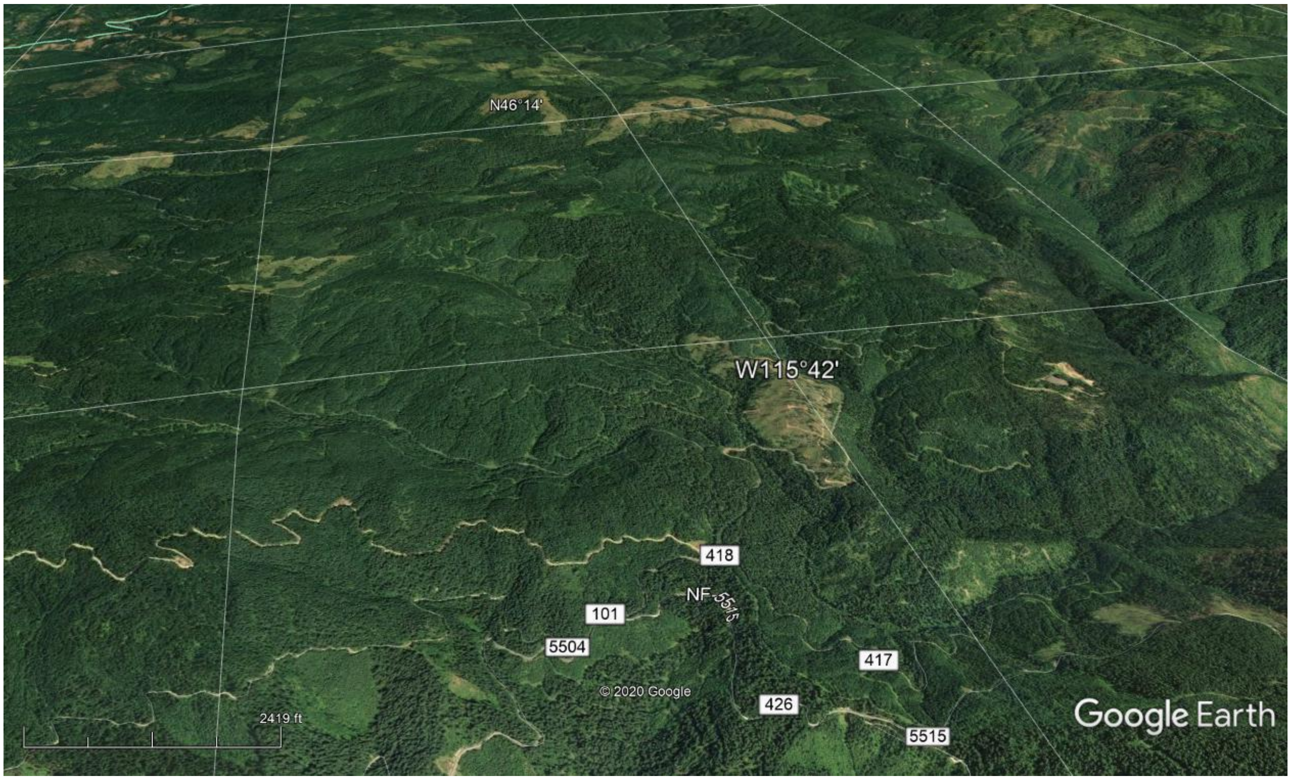


Photo 25: Pete King Creek Assessment Reach 6 mid 1990s Photo. Showing very little change in channels over time indicating stability and upward trend considering greater abundance of stream side vegetation today (compare photo 2 and 3) and less gravel bars indicating less bedload movement.

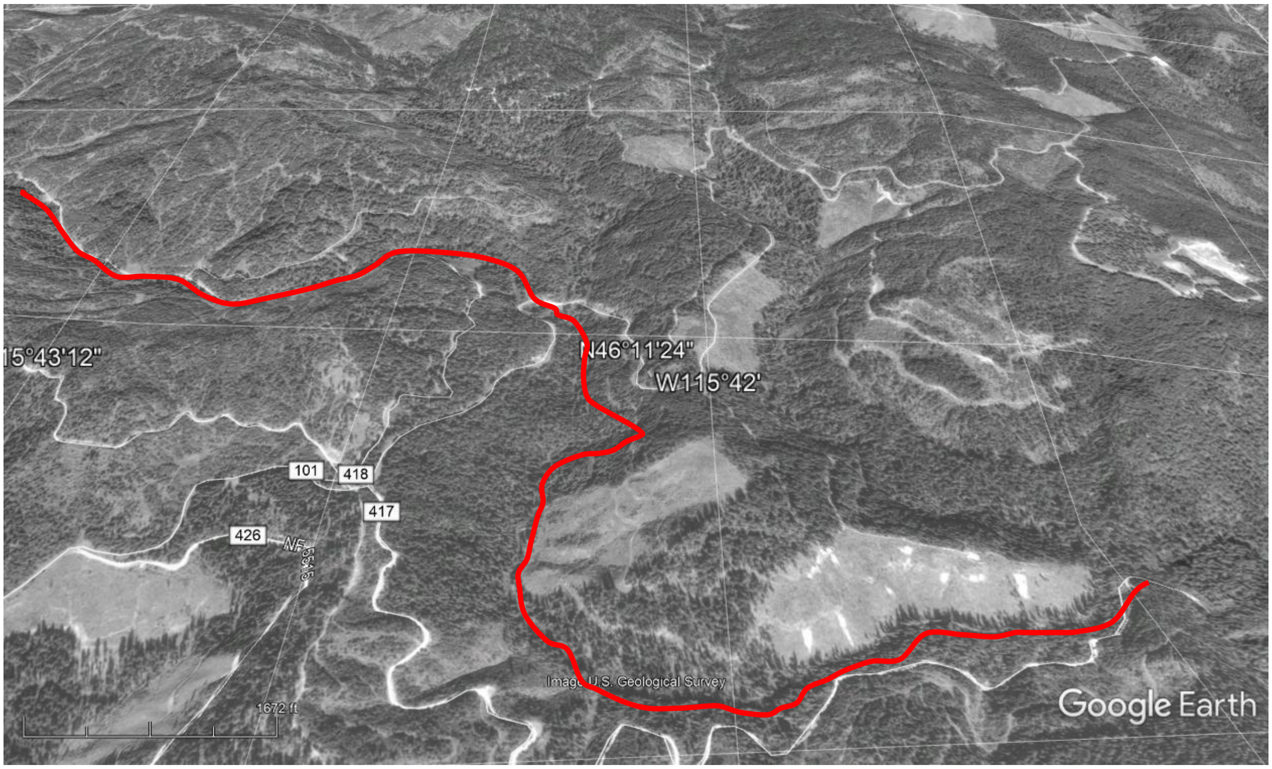



Photo 26 Reach 6: Pete King showing heavy vegetation on stream banks for stability and shade. Channel stability and resiliency to high flow events is high.

Photo 27 Reach 6: Stable and functioning road stream crossing. Recently constructed AOP crossing. Grasses on gravel bars indicate stable flows and high riparian function.

Photo 28 Reach 6: Pete King showing heavy vegetation on stream banks for stability and shade. Channel stability and resiliency to high flow events is high. LWD plays key role in stability and habitat formation.

Photo 29 Reach 6:  Pete King showing heavy vegetation on stream banks for stability and shade.  High level of riparian LWD equipment with multi age class conifers.

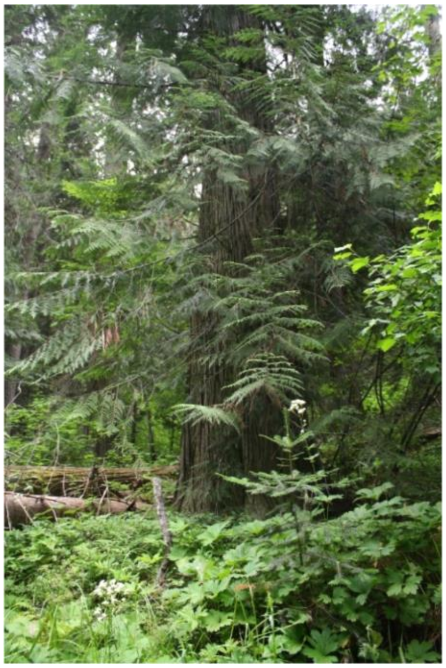


Photo 30 Reach 6:  Stable and functioning road stream crossing.  Grasses on gravel bars indicate stable flows and high riparian function.

Photo 31 Reach 6:  Pete King showing heavy vegetation on stream banks for stability and shade.  Channel stability and resiliency to high flow events is high.

Photo 32 Reach 6: Pete King showing heavy vegetation on stream banks for stability and shade. Channel stability and resiliency to high flow events is high.

Photo 33 Reach 6: Pete King showing heavy vegetation on stream banks for stability and shade. Channel stability and resiliency to high flow events is high.

Photo 34 Reach 6:  Pete King showing heavy vegetation on stream banks for stability and shade.  High level of riparian LWD equipment with multi age class conifers.

## References

Prichard, Don, work group leader. 1998. A user guide to assessing Proper Functioning Condition and the supporting science for lotic areas. Tech. Ref. 1737-15. National Applied Resource Science Center. Denver, CO. 126p.

Rosgen, Dave. 1996. Applied River Morphology. Wildland Hydrology. Pagosa Springs, CO. 350p.

# Appendix A Proper Functioning Condition (PFC) Methodology

Proper Functioning Condition (PFC) is a qualitative method for assessing the condition of riparian-wetland areas. The term PFC is used to describe both the assessment process and the condition of a riparian wetland area. The methodology was developed by a national interagency team and documented in a series of Technical References, TR 9 through 16 (Prichard et al., 1993 through 1999). See the PFC user's guides for more details on the PFC process
http://www.or.blm.gov:80/nrst/pfc.htm

The process involves the following steps:
1. Review existing documents--including maps, files and aerial photos.
2. Analyze the PFC definition--assess riparian/wetland based on a riparian area's capability and potential.
3. Assess Functionality--through document and field review. The rating is based on team discussion.
4. Institute the process--incorporate the information collected into a management plan.

The minimum national standards are achieved by using a standardized checklist. The PFC assessment, using the checklist, should work for most sites as long as the procedure is followed and definitions are understood. This is because the PFC was founded from rigorous science and is performed in an interdisciplinary setting.

The lotic (stream/moving water) checklist contains 17 items, which were qualitatively assessed by the PFC Team. The lentic (lake/wetland) checklist contains 20 items. The appropriate form was used by the IDT to assess riparian-wetland conditions. Items on the checklist relate to stream channel stability and/or wetland functionality, and receive "yes" or "no" answers. In some cases, "not applicable" is used. The checklist and its summarization, which can be done quickly, are used to classify the health or state of physical processes of the riparian-wetland area or reach being studied into one of four categories:

- Functional – At Risk (FAR)
- Nonfunctional (NF)
- Proper Functioning Condition (PFC)
- Unknown

The preponderance of "yes" and "no" responses help the ID Team determine the proper classification, however there is no set number of "yes" and "no" answers to determine which category a water body falls into. Team discussion is an important part of classification.

The significance of the classification categories are:

***PFC***: The stream channel, floodplain, and/or wetland have the physical characteristics that provide stability through various frequency events. This resiliency allows an area to produce desired values such as fish and wildlife habitat over time.

***FAR***: The stream or wetland is functioning but is lacking enough vegetation, soils or landform characteristics to withstand various frequency events without significantly damaging the riparian corridor. FAR is the only category that is further stratified by trend (up, down, not apparent). A downward trend rating indicates deteriorating conditions that could become NF. Deteriorated conditions can be transmitted both up and downstream. Trends that are not apparent require further study.

***NF***: The stream or wetland is not stable because it lacks most of the stabilizing physical characteristics and may continue to deteriorate. The degraded area or reach cannot sustain long-term desired values and return to proper-functioning condition without intervention (change in management).

***Unknown***: Sufficient information to make a rating is lacking. Additional study or data collection is necessary.

The results of the PFC assessment will be analyzed and presented in a written report. The report will outline numbers of streams and wetlands in a particular category i.e., PFC, FAR, NF, or Unknown.

Classification of reaches using the PFC method will help the local planning group establish a common vocabulary for discussing desired conditions in regard to key riparian-wetland landscape elements. The need, type, and location of more detailed inventories (upland methods as well as riparian-wetland corridor methods) can be prioritized once the PFC assessment classifications are known in preparation for developing restoration and management alternatives.

## PFC Standard Checklists
## Standard Lotic PFC Checklist

Name of Riparian-Wetland Area: ____________________________________________

Date:_________________ Segment/Reach ID______________________________

Miles:_________________ Acres:________________

ID Team Observers:________________________________________________________

| Yes | No | N/A | HYDROLOGY |
|---|---|---|---|
| | | | 1) Floodplain above bankfull is inundated in "relatively frequent" events |
| | | | 2) Where beaver dams are present they are active and stable |
| | | | 3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region) |
| | | | 4) Riparian-wetland area is widening or has achieved potential extent |
| | | | 5) Upland watershed is not contributing to riparian-wetland degradation |

Predominant Channel Type:

| Yes | No | N/A | VEGETATION |
|---|---|---|---|
| | | | 6) There is diverse age-class distribution of riparian-wetland vegetation(recruitment for maintenance/recovery) |
| | | | 7) There is diverse composition of riparian-wetland vegetation (for maintenance/recovery) |
| | | | 8) Species present indicate maintenance of riparian-wetland soil moisture characteristics |
| | | | 9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events |
| | | | 10) Riparian-wetland plants exhibit high vigor |
| | | | 11) Adequate riparian-wetland vegetative cover is present to protect banks and dissipate energy during high flows |
| | | | 12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery) |

Predominant Seral Stage:

| Yes | No | N/A | EROSION/DEPOSITION |
|---|---|---|---|
| | | | 13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) are adequate to dissipate energy |
| | | | 14) Point bars are revegetating with riparian-wetland vegetation |
| | | | 15) Lateral stream movement is associated with natural sinuosity |
| | | | 16) System is vertically stable |
| | | | 17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition) |

Bedload Composition:
Substrate Embeddedness:
**(Revised 1998)**

## Remarks

Reach Description:

________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________

Fish species observed:

Restoration Opportunities:

## Summary Determination

**Functional Rating:**

Proper Functioning Condition ________
Functional - At Risk ________
Nonfunctional ________
Unknown ________

**Trend for Functional - At Risk:**

Upward _____
Downward _____
Not Apparent _____

**Are factors contributing to unacceptable conditions outside the control of the manager?**

Yes ___
No ___

**If yes, what are those factors?**

___ Flow regulations ___ Mining activities ___ Upstream channel conditions ___ Channelization ___ Road encroachment ___ Oil field water discharge ___ Augmented flows ___ Other (specify)____________________________________